STRATEGY RESEARCH PROJECT

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U.S. INTERNATIONAL FRESH WATER POLICY – NEED, ANALYSIS, AND RECOMMENDATION

BY

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ABSTRACT

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Environmental concerns like deforestation, pollution, over-fishing and global warming exceed geographic boundaries. Among these significant and global environmental problems, the problem of the world's fresh water resources deserves special attention. The purpose of this paper is to describe the critical need for the United States to provide leadership in the development of a viable international agency. This agency would deal with the scarcity of fresh water and the possible future conflicts resulting from water disputes. This paper begins with a background section describing population growth; detailing how much water is available for use; finally detailing the water crisis by describing areas of the world where water has played a role in the conflict. These sections will show the critical need for the United States to develop an international water policy. Additionally, this paper will provide a critical analysis of the current United States policy and review some of the options available to deal with the international water crisis. This paper describes three viable courses of action which the U.S. could adopt. Finally, this paper concludes with a recommendation on which course of action would best suite the United States Government.

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U.S. INTERNATIONAL FRESH WATER POLICY – NEED, ANALYSIS, AND RECOMMENDATION

Globalization is a fact of life in today's world. Innovations like the Internet and instant worldwide communications have irreversibly linked the world and brought it closer together. More people are living under democracy and in free-market economies than at any other time in history. As technologies and economies become increasingly linked, so too do threats which endanger the United States and the world. A threat to one nation can be a threat to the entire world. This global link is clearly demonstrated in the recent terrorist attacks on the United States. The affect on the United States' economy and security is impacting the security and economy of nations around the world.

In a similar fashion, environmental concerns like deforestation, pollution, over-fishing and global warming exceed geographic boundaries. The scientific community, non-governmental organizations, and various governments, throughout the world, have linked environmental issues which can threaten human and animal survival. These environmental issues present major challenges, for the international community in the 21st Century, and must be tackled on a global scale.

Among these global and significant environmental problems, the problem of the world's fresh water resources deserves special attention. The huge increases in the world's population in the last 50 years coupled with the population growth predictions for the next 50 years have catapulted the fresh water problem to a crisis level. The international community must focus on water as a strategic resource for political, economic, social, and military reasons. Water as a strategic resource should be part of a country's foreign policy for it effects the food growing regions and provides stability to nations throughout the world.

There are plenty of examples around the world that lists water as an essential element in a nation's foreign and security policy. Although the common thought is that competition for oil will lead to conflict between nations, many people and governments believe that the scarcity of water is a more serious catalyst for conflict in the future. It is clear that shared water resources can lead to a downward spiral resulting in disputes, conflict, and ultimately war. On the other hand, it is also clear that the scarcity of water can be a catalyst for international cooperation, consultation and joint action.

The U.S. is the only superpower in the world, its military can reach every corner of the world. The U.S. is envied around the world and many countries attempt to model our form of government. Additionally, the U.S. economy significantly effects the world's economy. Therefore, the U.S. is the only country that which can provide the impetus and international

leadership ensuring there is cooperation and consultation on issues involving water prior to a conflict erupting in a region. This U.S. lead cooperation on water conflicts can also have a positive effect on other areas of conflict and is in the long-term interest of the Nation.

The purpose of this paper is to describe the critical need for U.S. leadership in the development of a viable international agency to deal with the scarcity of fresh water and possible future conflicts involving water. This paper begins with a background section describing population growth; detailing how much water is available for use; finally detailing the water crisis by describing areas of the world where water has played a role in the conflict. These sections will show the critical need for the United States to develop an international water policy. Additionally, this paper will provide a critical analysis of the current United States policy and review some of the options available to deal with the international water crisis. This paper describes three viable courses of action which the U.S. could adopt. Finally, this paper concludes with a recommendation on which course of action would best suite the United States Government.

BACKGROUND

To understand the fresh water crisis, one must understand what water provides for the human species. Clear, uncontaminated water is essential for human life. Fresh water is also essential for growing the crops which feed the population. Desalinated water cannot be used on crops. Many of the products essential to life in the 21st Century require fresh water in some form to sustain and/or reproduce. The basic piece to the water crisis puzzle is to understand how large the world population currently is and how fast it will increase in the future. This piece is required to determine how much food we must produce to adequately feed this bulging population.

POPULATION GROWTH

The world's population grew fairly slowly until about the 19th Century (See Figure 1 and Table 1). With advances in medicine, disease control, vaccines, and higher birth rates, the population soon began to increase exponentially.

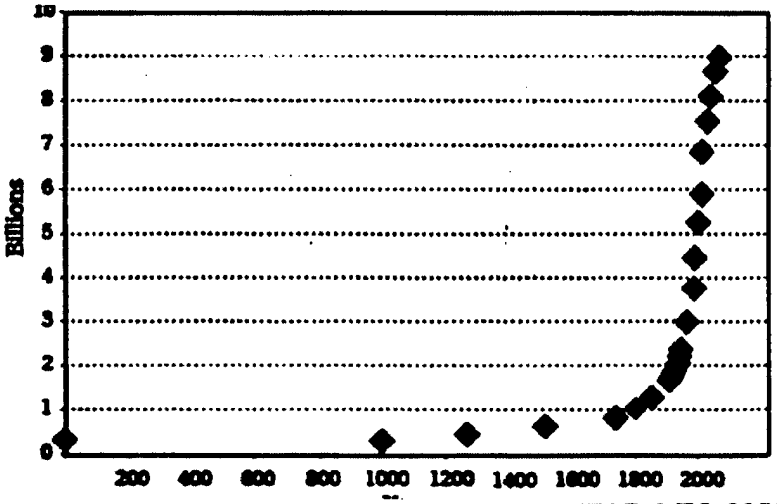

FIGURE 1 – WORLD POPULATION YEAR 0 TO 2050

Peter H. Gleick. World's Water 2000-2001: THE BIENNIAL REPORT ON FRESHWATER RESOURCES. Washington DC: Island Press. Pp. 212.

Year (A.D.)	Population
0	.3
1000	.31
1250	.4
1500	.5
1750	.79
1800	.98
1850	1.26
1900	1.65
1910	1.75
1920	1.86
1930	2.07
1940	2.3
1950	2.52
1960	3.02
1970	3.7
1980	4.44
1990	5.27
1998	5.9
2000	6.06
2010	6.79
2020	7.5
2030	8.11
2040	8.58
2050	8.91

TABLE 1 – WORLD POPULATION: YEAR 0 TO A.D. 2050[2]

"At the end of World War II, the earth's population stood at two billion; now it is nearing 6 billion. It took hundreds of thousands of years to reach the two billion mark; only 50 years to triple it. This gargantuan rise in population has crowded the cities, overtaken green spaces and created unprecedented demand for ...(water)."[1]

Official and unofficial population estimates of future populations abound and vary greatly. The best guess of the current population of the world is that it reached 6 million people in late 1999, and increase of 4.4 billion in the twentieth century alone. By 2050, the UN's medium estimate projects that the world's population will exceed 8.9 billion, with a range of population of between 7.3 and 10.7 billion; a difference of more than 3 billion people (UN 1998). Figure 2 shows the increase in global and regional populations from 1750 to 2050, using the UN future medium projections for 2050. This vast spread, even ignoring all the other uncertainties involved, greatly complicates both planning and estimating whether or not there will be a problem meeting future food needs, Fertility rates, as typically measured by the number of children per woman, have dropped more quickly in some regions than anticipated, particularly where education, family planning, and contraceptives have been made available. But in other regions, nearly unrestrained population growth continues. It thus appears likely that the world will have 3 billion more mouths to feed – and potentially as many as 4.7 billion more – by 2050. And 95 percent of the population increase will be in developing countries, where the greatest food and water problems already exist.[3]

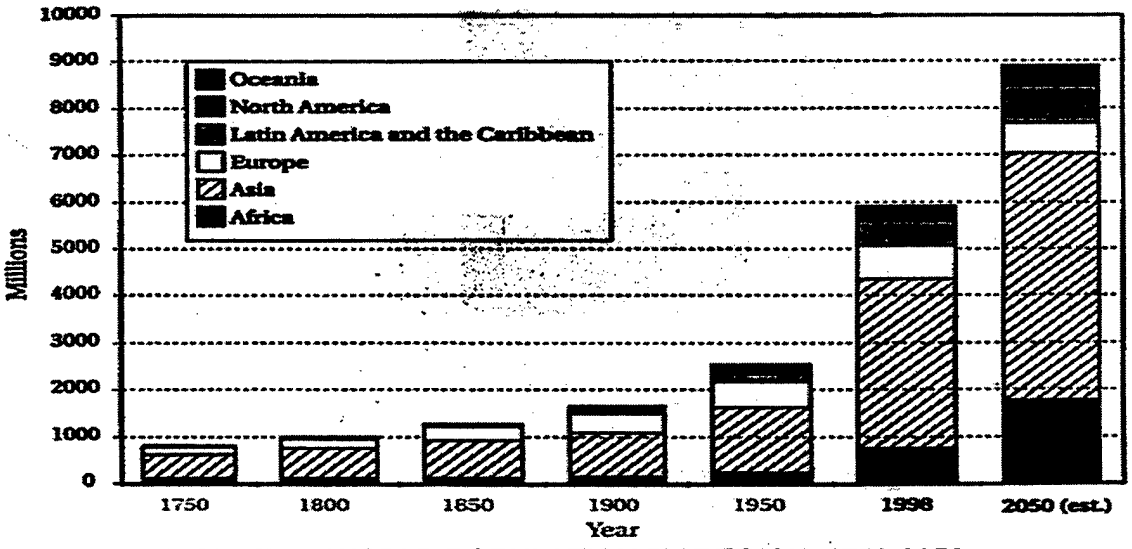

FIGURE 2 – WORLD POPULATION BY REGION: 1750-2050

Peter H. Gleick. World's Water 2000-2001: THE BIENNIAL REPORT ON FRESHWATER RESOURCES. Washington DC: Island Press. Pp. 67.

HOW MUCH WATER IS THERE?

So how much water is there on earth and is it available to this growing population? "Water is a finite resource. There is the same amount of water on the planet today as there was in prehistoric times; the earth is not making more water, just moving it from place to place."[4] The world's growing population is having a huge impact on the availability of fresh water for drinking, for irrigation, and for life. Despite vast improvements in our ability to monitor water sources and usage, computer modeling, and technology advances, information on the amount of fresh water on earth is still neither reliable nor accurate. As a result, estimates of water stocks and flows are approximations.

> Table 2 presents a recent estimate of the major water stocks on earth, separated by salt and freshwater stocks. The total volume of water on earth is approximately 1.4 billion cubic kilometers (km3) and only 2.5 percent of it, or about 35 million km3, is fresh water. The vast majority of fresh water is in the form of permanent ice or snow, locked up in Antarctica and Greenland, or in deep groundwater aquifers, The principal sources of water for human use are lakes, rivers, soil moisture, and relatively shallow groundwater basins, The usable portion of these sources is estimated to be only about 200,000 km3 of water – less than 1 percent of all fresh water on earth and only one one-hundredth of a percent (0.01%) of all water on the planet. And much of this water is located far from human populations.[5]

	Volume ($1000km^3$)	Percentage of Total Water	Percentage of Total Fresh Water
SALT WATER STOCKS			
Oceans	1,338,000	96.540	
Saline/brackish groundwater	12,870	.9300	
Saltwater Lakes	85	.0060	
FRESHWATER STOCKS			
Glaciers/Permanent snow	24,064	1.7400	68.70
Fresh groundwater	10,530	.7600	30.06
Ground ice/permafrost	300	.0220	.860
Freshwater lakes	91	.0070	.260
Soil moisture	17	.0010	.050
Atmospheric water vapor	13	.0010	.040
Marshes/wetlands	12	.0010	.030
Rivers	2	.0002	.006
Total Water on Earth (1000 km^3)	1,386,000	100	
Total Fresh Water on Earth (1000 km^3)	35,029		100

TABLE 2 – MAJOR STOCKS OF WATER ON EARTH
(THOUSAND CUBIC KILOMETERS)[6]

Much of this available fresh water is contaminated or polluted. This adds to the problem of water scarcity. "An estimated 14 to 30 thousand people, mostly young children and elderly, die every day from water-related diseases. At any given moment, approximately one-half of the people in the developing world suffer disease caused by drinking contaminated water or eating contaminated food."[7] This amounts to over a billion people drinking water which is contaminated or polluted.

WATER REQUIREMENTS

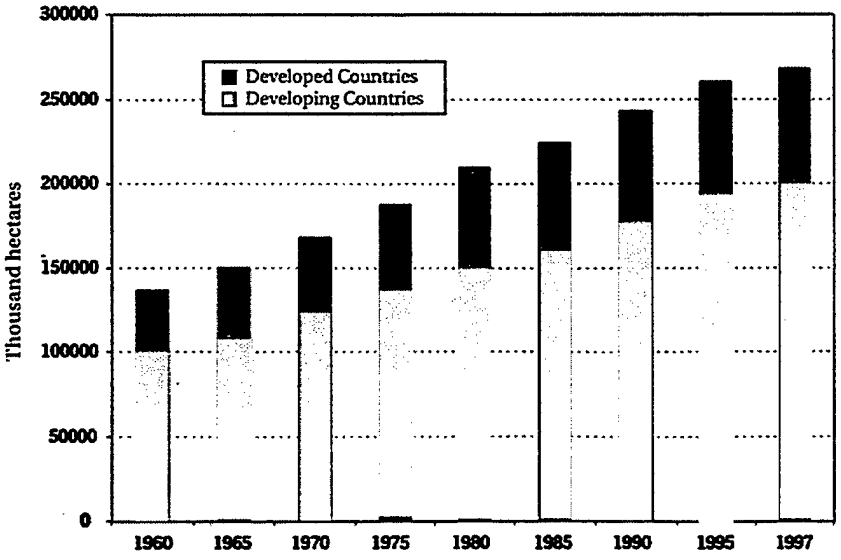

FIGURE 3 – IRRIGATED LAND: 1960-1997

Peter H. Gleick. World's Water 2000-2001: THE BIENNIAL REPORT ON FRESHWATER RESOURCES. Washington DC: Island Press. Pp. 81.

Water is withdrawn from the total amount available in four broad categories: Agriculture, Industrial, Domestic, and Evaporation. Agriculture use is by far the largest fresh water user of the four. It is in this category that vast amounts of fresh water are used to irrigate crops and thus feed the growing population described above. Figure 3 provides the approximate water requirements to produce a kilogram of various crops required for consumption. Of course there is a wide variance in the amount of water used depending on the region it is grown, the country growing it (developed vs. underdeveloped), and the type of irrigation utilized.

As a country's population grows, generally the number of acres required for food production increases. This is extremely evident in underdeveloped countries (See Figure 3). Many of these countries use the most primitive means of irrigation in crop production. In many places, half the water applied to a field is wasted due to evaporation or sinks into the ground prior to reaching the growing fields. Additionally, often this loss due to transport or run-off is contaminated and cannot be reused; thus exacerbating the water shortage problem. Technologies exist to correct these problems. However, due to cost and resources required to implement these technologies a viable international agency must provide this assistance to

developing nations. Not surprisingly, it is the developing countries where future conflict over scarce fresh water is most likely to take place.

WATER CONFLICT

By 2015, the CIA reports that "over 3 billion people will live in water-stressed regions ... with implications for conflict."[8] By 2025, over 50% of the world's 8 billion people will not have access to safe water resources.[9] Possible conflicts will come when the scarcity of water generates political instability. Increasing demands for water in river basins shared by two or more countries are potential flash points in the future global environment.

The scarcity of water is a troubling security issue. Scarcity of water locks developing nations into a competitive struggle in which governments must provide the water for the thirst, hygiene, and food production of their restless population, no matter what the cost. Water becomes a vital national interest. When rivers cross borders and are consumed both within and between countries, this water scarcity leads to stress, and that stress can lead to water wars.

Continent	1978	1999
Africa	57	60
North and Central America	33	39
South America	36	38
Asia	40	53
Europe	48	71
Totals	214	261

TABLE 3 – NUMBER OF INTERNATIONAL RIVER BASINS, BY CONTINENT[10]

Naturally, there are more countries in the world then there are rivers and thus, these rivers must be shared by these countries. Before the breakup of the Soviet Union, there were 214 international river basins (See table 3). With the emergence of new, independent countries, there are now 261 international river basins. These rivers carry 80% of the earth's available fresh water. Some twenty-one nations, such as Bangladesh, lie completely within shared river basins; they do not completely own a river source of fresh water. Table 4 shows the international rivers that are shared by five or more states. In many of these regions, it is easy to see that water can be a cause of conflict or a catalyst in a conflict.

River Basin	Number of States	States Sharing the Basin
Danube	17	Romania, Hungary, Yugoslavia (Serbia and Montenegro), Austria, Germany, Bulgaria, Slovakia, Bosnia-Herzegovina, Croatia, Ukraine, Czech Republic, Slovenia,

		Moldova, Switzerland, Italy, Poland, Albania
Congo	11	Deomocratic Republic of Congo, Central African Republic, Angola, Republic of Congo, Zambia, United Republic of Tanzania, Cameroon, Burundi, Rwanda, Gabon, Malawi
Niger	11	Nigeria, Mali, Niger, Algeria, Guinea, Cameroon, Burkina Faso, Benin, Ivory Coast, Chad, Sierra Leone
Nile	10	Sudan, Ethiopia, Egypt, Uganda, United Republic of Tanzania, Kenya, Burundi, Rwanda, Eritrea, Democratic Republic of Congo
Rhine	9	Germany, Switzerland, France, Netherlands, Belgium, Luxembourg, Austria, Liechtenstein, Italy
Zambezi	9	Zambia, Angola, Zimbabwe, Mozambique, Malawi, United Republic of Tanzania, Botswana, Namibia, Democratic Republic of Congo
Amazon	8	Brazil, Peru, Bolivia, Colombia, Ecuador, Venezuela, Guyana, Suriname
Lake Chad (internal drainage)	8	Chad, Niger, Central African Republic, Nigeria, Algeria, Sudan, Cameroon, Libya
Tarim	7	China, Kyrgyzstan, Pakistan, Tajikistan, Kazakhstan, Afghanistan, India
Volta	6	Burkina Faso, Ghana, Togo, Mali, Benin, Ivory Coast Republic of Congo
Aral Sea (internal drainage)	6	Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan, China
Ganges/Brahmaputra/ Meghna	6	India, China, Nepal, Bangladesh, Bhutan, Myanmar
Jordan	6	Jordan, Israel, Syria, West Bank, Lebanon, Egypt
Mekong	6	Laos, Thailand, China, Cambodia, Vietnam, Myanmar
Tigris-Euphrates/ Shatt al Arab	6	Iraq, Turkey, Iran, Syria, Jordan, Saudi Arabia
Kura-Araks	6	Azerbaijan, Georgia, Armenia, Turkey, Russia, Iran
Neman	5	Belarus, Lithuania, Poland, Russia, Latvia
Vistula/Wista	5	Poland, Ukraine, Belarus, Slovakia, Czech Republic
La Plata	5	Brazil, Argentina, Paraguay, Bolivia, Uruguay

TABLE 4 – INTERNATIONAL RIVER BASINS SHARED BY FIVE OR MORE STATES
Peter H. Gleick. World's Water 2000-2001: THE BIENNIAL REPORT ON FRESHWATER RESOURCES. Washington DC: Island Press. Pp. 34.

HISTORICAL EVIDENCE

This sharing of international river basins can be a source of stress and conflict. Modern history has plenty of examples of the connections between water and conflicts. In Table 5, an abbreviated chronology of past water conflicts are provided. This chronology presents an understanding of the connections between water systems, water resources and conflict in the international community. For a complete chronology, see Table 6 on page 18. The categories under the heading "Basis of Conflict" are defined as follows:

Control of Water Resources: (state and nonstate actors): where water supplies or access to water is at the root of tensions.

Military Tool (state actors): where water resources, or water systems themselves, are used by a nation or state as a weapon during a military action.

Political Tool (state and nonstate actors): where water resources, or water systems themselves, are used by a nation, state, or nonstate actor for a political goal.

Terrorism (nonstate actors): where water resources, or water systems, are either targets or tools of violence or coercion by nonstate actors.

Military Target (state actors): where water resources are targets of military actions by nations or states.

Development Disputes (state and nonstate actors): where water resources or water systems are a major source of contention and dispute in the context of economic and social development.[11]

Date	Parties Involved	Basis of Conflict[1]	Violent Conflict or in the Context of Violence	Description
1503	Florence and Pisa warring states	Military Tool	Yes	Leonardo da Vinci and Machiavelli plan to divert Arno River away from Pisa during conflict between Pisa and Florence.
1863	United States Civil War	Military Tool	Yes	General U.S. Grant, during the Civil War campaign against Vicksburg, cut levees in the battle with the Confederates.
1940-1945	Multiple parties	Military target	Yes	Hydroelectric dams routinely bombed as strategic targets during World War II.
1950s	Korea, United States, others	Military target	Yes	Centralized dams on the Yalu River serving North Korea and China are attacked during Korean War.
1960s	North Vietnam, United States	Military target	Yes	Irrigation water supply systems in North Vietnam are bombed during the Vietnam War.
1967	Israel, Syria	Military target and tool	Yes	Israel destroys the Arab diversion works on the Jordan River headwaters. During Arab-Israeli War Israel occupies Golan Heights, with Banias tributary to the Jordan; Israel occupies West Bank.
1991	Iraq, Kuwait, United States	Military target	Yes	During the Gulf War, Iraq destroys much of Kuwait's desalination capacity during retreat.
1991	Iraq, Kuwait, United States	Military target	Yes	Baghdad's modern water supply and sanitation system are intentionally targeted by Allied coalition.
1999	Yugoslavia	Military target	Yes	NATO targets utilities and shuts down water supplies in Belgrade. NATO bombs bridges on Danube, disrupting navigation.

TABLE 5 – WATER CONFLICT CHRONOLOGY[12]

This chart and Table 6 show that conflicts involving the scarce resource of water have been a part of the international scene for hundreds of years and that water has played a role in some recent international events such as the Balkans and East Timor.

FUTURE CONFLICTS

Where will the next conflict erupt involving water? The odds are that any of the 145 nations who share a common river will disagree with each other over the use of that river. Possible hot-spots around the globe include the Middle East, Southern Africa, or South Asia. For example, the Nile basin is ripe for future conflict. There is no way that Ethiopia, Sudan and Egypt can all achieve their irrigation and food production goals from the Nile alone. There is not enough water for the needs of all three countries and currently no treaty or agreement is in place to resolve this potential problem.[13]

Other examples are the dams and reservoirs Turkey is building on the Tigris and Euphrates rivers. Iraq receives 90% of its surface water from these two rivers.[14] Turkey has the power to severely limit the amount of water Iraq receives. Again, there is no agreement in place between these two countries concerning the use of water resources in the region.

In addition to state actors threatened by future conflict with other states, the new threat of nonstate actors has moved to the forefront. With the 11 September terrorist attacks on the United States, the security, of all nations, is threatened by terrorists. It would be quite simple for a terrorist organization to bring publicity to their cause by attacking a water supply of a major city or country. As seen in the chronology, this has been done before but on a limited scale. It now could easily be adapted in a large-scale attack to cause massive destruction, illness and death.

There are plenty of experts, policy makers, and heads of organizations that have warned of coming water wars.

> - In 1991, World Water co-Commissioner Asit Biswas predicted that 'the political tensions between certain neighboring countries over the use of international rivers, lake, and aquifers may escalate to the point of war, even before we move into the 21st Century.
>
> - Four years later, World Bank vice-president for environmentally sustainable development, Ismail Serageldin, warned 'wars of the next century will be over water, not oil.'
>
> - 'My fear is that we're headed for a period of water wars between nation,' said Klaus Topfer, head of the UN Environment Programme. 'Can we afford that, in a world of globalization and tribalalisation, where conflicts over natural resources and the numbers of environmental refugees are already growing?'

> - 'Battles have been fought over water allocation in many countries,' asserts Mikhail Gorbachev. 'The potential for a conflict over water is perhaps at its most serious in the Middle East where water supplies are extremely limited, political tensions traditionally are run high, and water is just one of the issues that may divide countries.'[15]

Spokespersons such as these help awaken the international community to the underlying scarcity of water and help rally international support to become more progressive and interdependent.

There are some countries that have come to agreement, although in a limited way, over scarce water. Israel and Syria, Israel and Jordan, and Syria and Jordan all have agreements, some of them informal, on the allocation on water.[16] However, these agreements are exceptions and do not represent the norm in the world. There have been many forums for international discussions on the coming global water problem, for example the World Water Conference and the World Water Forum. However, currently there is no international regulatory authority to diffuse disputes, promote water saving technologies and conservation, and plan for future water availability for all.

UNITED STATES POLICY

Currently, the United States does not have an international fresh water policy. The State Department is designated as the lead agency in this area. U. S. Code Title 22, Chapter 38, section 2686a state that the "Secretary of State shall designate a special coordinator for Water Policy Negotiations and Water Resources Policy ... to coordinate U.S. Government response to international water resource disputes and needs ... to represent the U.S. Government ... in discussions concerning access to fresh water and to formulate U.S. policy (for) resolution of international problems posed by lack of fresh water supplies."[17] This position is currently vacant.

Mr. Aaron Salzberg, point of contact for water resource management at the State Department states that the U.S. deals with water issues on a case-by-case basis. He outlined three principal points influencing U.S. goals and objectives (ends): 1) Improve conservation and management of water resources; 2) Mitigate tensions with shared resources; 3) Use as a diplomatic tool (means) to promote cooperation and trust.[18]

Fresh water policy is also not referenced in the last National Security Strategy (NSS) document. The closest the NSS comes to referencing water is under the "Promoting Prosperity" national interest where it states that "promoting sustainable development" and "meeting human and environmental needs."[19] The Clinton Administration did establish the Under Secretary of

State for Global Affairs "to ensure our citizens have secure air to breath, food to eat, and water to drink."[20]

The Clinton Administration's policy towards fresh water was outlined in the U.S. State Department's 1997 First Annual Report on the Environment and Foreign Policy. In this report, "ensuring the availability of enough clean water for an increasingly thirsty planet is vital to American interests. The struggle for limited resources has historically created tension among nations in key regions of the world, and the ability of individual nations to provide drinkable water for their people directly affects their continued prosperity and stability."[21]

More recently, then Secretary of State Madeleine K. Albright outlined the U.S. Government position during her Earth Day 2000 speech at the National Defense University to address the water crisis in three ways. First, to address the technical aspect of how much water we waste. Second, to address the economics of water or how it is priced. And finally, to use diplomacy to join with other nations to develop regional approaches to water issues.[22]

ANALYSIS

There is currently no stated U.S. policy objective regarding the scarcity and access to fresh/drinkable water in the world. The Bush administration will handle water problems as they arise. The previous administration's goal (end) was "to dramatically improve the management of trans-boundary water resources; eliminate water as a source of regional instability; and use cooperation on water as a basis for bringing nations together on other issues."[23] As noted above, a spokesperson in the Bush administration states the objectives are to improve conservation and management of water resources. This will mitigate tensions with shared resources, and could use water as a diplomatic tool to promote cooperation and trust.

Clearly, the Clinton and Bush administrations have similar ends in mind regarding the danger to this vital and indispensable resource. The Clinton administration's policy is a result of longer analysis covering the global water situation. The Bush administration's objectives could very well be just a reworded carryover from the previous administration. It is assumed that the Bush administration has not had time to formally develop a foreign policy on water, and due to recent events, this issue has not surface as a priority.

There are a number of reasons why the United States should develop a permanent foreign policy towards fresh water. First, having a proactive foreign policy towards water is in the Nation's best interest. Economic, social, and political stability of the world helps ensure that the U.S. will not have to provide economic aid packages or to intervene militarily in foreign countries due to drought induced water problems or disputes resulting from water shortages.

Agreements and cooperation over water can lead to further agreements on trade, weapons, communications and other environmental issues. It ensures that assets will not be diverted from more important issues to deal with water disputes.

Second, U.S. foreign water policy will improve communications between the U.S., international organizations such as the U.N., and the countries where water conflict could possibly erupt. Increased/better communication will lead to better understanding of the water crisis and regional peculiar difficulties. This increased communication can lead to the furthering of other U.S. interests in the region.

Third, water policy can lead to advancement of other U.S. priorities. Cooperation on water issues can be a catalyst for peace and prosperity. U.S. involvement in countries with water scarcity problems can provide a conduit for the U.S. to further democratic ideas to nations who are already Democratic. More democratic states, increased trading partners, and stable governments are in the Nation's best interest.

Fourth, the water policy should recognize water not as a weapon or economic tool, but as a means to advance the world's health. Dealing with water problems in developing nations can provide the opportunity to address major health issues. Cutting off famine before it can start by addressing the issue of water scarcity, can eliminate the need for a massive humanitarian effort in the future.

Many of the underdeveloped countries in the world are a breeding ground for unrest and often harbor terrorist organizations. These organizations base their operations in these nations due to the country's inability to interdict, control or eliminate these groups. A fifth reason to have a permanent water foreign policy is to develop cooperation and assistance in countries that harbor terrorist organizations. This can provide the U.S. an opportunity to support these notions in their fight to eliminate these terrorist cells and keep them from returning.

Finally, water is unique from other resources. Even though it is scarce, it is renewable. A viable foreign water policy will help to develop better conservation, reuse, and recycle means throughout the world. Ensuring there is enough water for all and that all countries understand the importance of water and know how to sustain their use of fresh water is a national interest of the U.S.

WATER RESOURCE ALTERNATIVES

The following are some methods (ways) which have been discussed and/or are being used to achieve these goals (ends): The first and probably the most promising is to improve the efficient use of water. This means developing more ways to conserve the use of water and

thereby increasing the amount of water available. Second is to recover, recycle, and reuse water more efficiently. In this method, technologies must be increased to recapture water which is used. Once captured, it must be cleaned, it then becomes available for reuse. Using this method, we ensure that the way we initially use the water does not permanently damage it for reuse. Third, is to advance the technologies which will increase the amount of water available for use by the bulging human population. Some of these techniques include rain water harvesting, increased use/development of saltwater desalination plants, redirecting oil tankers to carry fresh water, fog collection, and harvesting fresh water from the frozen Polar Regions. Fourth, we must educate people on water management and encourage sound regional management plans. Fifth is the development and support of an international institution governing water and its use. Sixth is to improve the agricultural use of water. This includes applying technologies which can genetically modify crops to use less water. Additionally, we can improve irrigation technologies, regulate land use, and improve meteorological forecasting. This method can also include the use of "virtual water" where surplus food crops from "Country A" can be provided to "Country B." This will eliminate the use of low production/high water use techniques in the Country B.

These are just some of the hundreds of methods available to deal with the water scarcity crisis. No one method can alleviate the problem by itself. A policy must be developed that incorporates many of these methods to provide the most beneficial way to deal with fresh water scarcity. The U.S., as the lead nation, along with international organizations such as the U.N., Western European Union (WEU), and European Union (EU) can help eliminate future conflicts over water.

Currently, the resources (means) being dedicated to these methods (ways) are not in balance. The U.S. Government is not taking the lead among the nations of the world to coordinate and institute solutions to this growing crisis. The State Department must develop a policy that will ensure international progress is made on this problem and implement a sustained long-term solution. Sources from all around the world are calling for international progress on the water problem. Some examples of trends that they say will shape any policy that is developed in the next 15 to 20 years are:

- Currently, 5 million people die each year from water-related illness.[24] This figure will only continue to grow unless the U.S. takes a proactive lead in the fight against decreasing water supplies.

- 3 billion people will live in severe water shortage regions in 25 years.[25]

- Of every two major rives and lakes on the planet, one is seriously sick.[26]

- Safe water resources will elude 50% of the world's 8 billion people by 2025.[27]

- Global water demand tripled between 1950 and 1990; it is expected to double again within 35 years.[28]

- From 1950-1993, the amount of irrigated land increased from approximately 250 million acres to approximately 600 million acres. This increase will put enormous pressure on aquifers, rives and other water sources.[29]

- Irrigated agriculture uses up 70% of all fresh water taken from lakes, rivers, and aquifers; 20% to industry and 10% to cities.[30]

- Human society now derives 40% of its food from irrigated land.[31]

- Farmers compete with booming cities for water. 2.5 billion people live in cities now and it is estimated that figure will be 5 billion by 2025.[32]

- Wars will be fought over possession and control of vital ... resources needed for the functioning of modern industrial societies.[33]

These are just some of the trends impacting on water policies in the U.S. and many nations around the world. The risks involved with not addressing these trends are both obvious and tremendous. If the global community, lead by the U.S., does not address these risks, their impact on the methods (ways) to deal with the water crisis will continue to grow. As they grow, they will render some methods infeasible.

COURSES OF ACTION

Fresh water availability must become a priority for American foreign policy. Whatever course of action the U.S. Government takes, it must build upon three fundamentals. First, the U.S. must recognize that water problems are often a root cause to many challenges which many nations currently face and many more will face around the world. For example, in Central Africa, rapid population growth combined with competition for scarce water fuels conflict and misery on a daily basis, which is only getting worse.

Second, due to increased globalization, everything is linked and water is no exception. The damage to the Nation's water supplies and the water supplies of other nations threatens not only the health and future economy of the U.S. but also of the world. The U.S. understands that water supplies can be protected effectively when nations cooperate and work together.

Third, the U.S. knows that problems can be solved when the it takes the lead. As the remaining superpower, the U.S. can use its resources to guide other nations, non-governmental organizations (NGOs), and businesses to accomplish certain objectives. President Kennedy

said, "Problems created by man can be solved by man."[34] It is up to the U.S. to provide a solution and the international guidance to this man-made water crisis.

There are three primary courses of action the administration can take regarding fresh water supplies throughout the world.

COURSE OF ACTION 1

The U.S. can continue the current policy. In this case, the administration will handle water supply problems throughout the world on a case-by-case basis. For example, when Turkey actually cuts off the flow of the Tigris and Euphrates rivers into Iraq and the children of Iraq start dying from water related illnesses or the lack of water, then the United States will take action to correct this problem. Another example would be to take action when the Jordan and Israel begin fighting over the remaining water in the Jordan River.

Taking this approach, to water foreign policy, may not seem optimal, but it does initially keep the U.S. out of regional disputes. Proponents of this option would say that there are enough problems to deal with inside the U.S. and to let the nations in these regions develop ways to answer their growing regional water crisis. This option is isolationist in its nature. The U.S. currently has severe homeland security issues to deal with, and diverting resources from this mission to tackle these regional water issues would at this time not seem feasible. They also note that the country is already over-extended in regions that may not be vital to national interests. For example, the U.S. continues to have military forces locked into areas like the Balkans, Sinai, Iraq, and Kuwait.

Opponents of this option advocate that this puts the country in a reactive mode. Taking this course of action does not allow the U.S. to lead other countries, thus not allowing the U.S. any control over the outcome. This kind of policy ensures future U.S. involvement in water disputes which will be expensive and will likely involve the military.

COURSE OF ACTION 2

The second course of action is for the U.S. to invest in specific water technologies. These technologies should show promise and should be provided along with the funds necessary to develop them in countries where water shortages currently exist. In this way, the U.S. can use these benefits as leverage in order to further U.S. interests in these regions. Some of these technologies are saltwater desalination plants, rainwater harvesting, recycle-recover-reuse techniques, fog collection, "virtual water" and converting oil tankers to redistribute fresh water.

Proponents of this option say the U.S. has the technology to develop solutions to these water problems in most of the regions around the world. The additional spin off that this type of research, development and subsequent production would enhance the economy of the United States.

Opponents say that this option can be expensive if the U.S. takes this approach by itself. This course of action does not use the power of combining the efforts of the international community to solve the water problem. If the U.S. adopts this course of action, it would be more expensive for the U.S. in the long run. By funding these technologies on their own, this course of action would be expensive for the U.S., require different approaches depending on the region of the world where the technology was to be used, and would not take into account the technological power that other nations have and can develop.

COURSE OF ACTION 3

A third course of action, which is really the antithesis to course of action one, is to harness the global community's power towards the world's growing water supply crisis. In this course of action, the U.S. would be the lead nation to establish an international system for assessing water supplies, flows and aquifers throughout the world. This would require an international agency, most likely organized under the United Nations to address current water problems and work to alleviate problems envisioned in the next 25 years.

This United Nations organization would have to be backed by an international water court that would objectively settle water disputes. If all parties agree to this court or arbiter, the specter of U.S. imposing its will on other countries could be minimized. This organization would also take the lead on encouraging development and sharing of water saving technologies throughout the world. It could provide the funding/loans to poor countries in order that they could attain the water they need for crop production, health of their population, and general economic development.

Opponents of this course of action disagree with turning over control to an organization that may not always have the best interests of the U.S. in mind when decisions are made in certain regions of the world. They also say that the U.N. does not have the power or force to impose the international will when it comes to regulating a resource as basic to human life as water.

Whatever the pros and cons for each course of action, it is clear that the U.S. must choose a course of action. The U.S. must develop a coherent foreign policy towards the world-

wide scarcity of fresh water, and aggressively implement this policy to ensure that water, which is the basic necessity for life, is available for all.

RECOMMENDATION

The U.S. should change its policy towards global fresh water problems. The current policy of dealing with international water problems on a case-by-case basis does not provide the country with a long-range policy that can effect the situation before it becomes a crisis. The starvation and subsequent relief efforts and conflict in Somalia are an excellent example of why this type of policy does not work. Hundreds of thousands of people died before U.S. troops were sent in on a relief effort. One of the primary reasons the country could not feed its populace was due to the lack of available water.

A more proactive and international effort to this situation before it became a crisis could have possibly averted the starvation and the subsequent peace-keeping operation, armed conflict, and loss of American lives in that country. Therefore, it is recommended that the administration adopt course of action three.

This course of action holds the best promise for U.S. interests in the future. Adopting this course of action can solve international fresh water supply problems before they become a crisis, or before people die from the lack of water. The alternative is for the U.S. military to enter the fray in relief efforts, as peace keepers, or to solve armed conflicts over water.

The establishment of an international body to develop technologies, settle disputes, and solve water problems before they become a crisis is imperative to U.S. interests. This organization could serve as the focal point for development of water conservation, reuse, and development technologies. In this manner, it could tap into the international community's power to develop techniques, tailored to the various regions of the world to solve their water problem. The United Nations is the international organization to take on this mission. The U.N., strongly backed by the U.S., has demonstrated the ability to solve international problems in the past and to galvanize world opinion on major issues.

The U.N. must establish a separate "water court" to handle disputes over fresh water access and availability. This court, modeled after the one in The Hague, will be the arbiter for water conflicts and allow countries to present their positions in a forum which will abide by established international law and know that the decision is being made in an objective manner. The establishment of this court and the agreement by all members of the United Nations to abide by its decisions will be a major step forward in resolving the water crisis.

Not every country likes or desires assistance from the U.S. Many forgo U.S. assistance because of the price the country perceives that they must pay for this assistance. They feel this price is often manifested in a loss or severe impact on the society norms. This international water court will eliminate the possible conflict that some countries have when the U.S. steps in to solve international issues.

This international approach course of action will not take place without a catalyst. The U.S. must be that catalyst. The U.S. must adopt a permanent fresh water foreign policy that contains the elements described in this course of action. "The massive numbers dying for lack of ... water will be seen by all of us over and over again if the world does not act, and action requires U.S. leadership. No other nation has our capability and resources to lead." [35]

Date	Parties Involved	Basis of Conflict[1]	Violent Conflict or in the Context of Violence	Description
1503	Florence and Pisa warring states	Military Tool	Yes	Leonardo da Vinci and Machiavelli plan to divert Arno River away from Pisa during conflict between Pisa and Florence.
1642	China, Ming Dynasty	Military Tool	Yes	The Huang He's dikes have been breached for military purposes. In 1642, toward the end of the Ming dynasty (1368-1644), General Gao Mingheng used the tactic near Kaifeng in and attempt to suppress a peasant uprising.
1863	United States Civil War	Military Tool	Yes	General U.S. Grant, during the Civil War campaign against Vicksburg, cut levees in the battle with the Confederates.
1898	Egypt, France, Britain	Military and political tool, control of water resources	Military Maneuvers	Military conflict nearly ensues between Britain and France in 1898 when a French expedition attempted to gain control of headwaters of the White Nile. While the parties ultimately negotiated a settlement of the dispute, the incident has been characterized as having "dramatized Egypt's vulnerable dependence on the Nile, and fixed the attitude of Egyptian policy-makers ever since.
1938	China and Japan	Military tool, military target	Yes	Chiang Kai-shek orders the destruction of flood-control dikes of the Huayuankou section of the Huang He (Yellow) River to flood areas threatened by the Japanese army. West of Kaifeng, dikes are destroyed with dynamite, spilling water across the flat plain. The flood destroyed part of the invading army and its heavy equipment was mired in thick mud, though Wuhan,

				the headquarters of the Nationalist government was taken in October. The waters flooded an area variously estimated as between 3000 and 50,000 square kilometers, and killed Chinese estimated in numbers between tens of thousands and 1 million.
1940-1945	Multiple parties	Military target	Yes	Hydroelectric dams routinely bombed as strategic targets during World War II.
1943	Britain, Germany	military target	Yes	British Royal Air Force bombs dams on the Mohne, Sorpe, and Eder Rivers, Germany (May 16,17). Mohne Dam breech killed 1200, destroyed all downstream dams for 50 km.
1944	Germany, Italy, Britain, United States	Military tool	Yes	German forces use waters from the Isoletta Dam (Liri River) in January and February to successfully destroy British assault forces crossing the Garigliano River (downstream of Liri River). The German Army then dams the Rapido River, flooding a valley occupied by the American Army.
1944	Germany, Italy, Britain, United States	Military tool	Yes	German Army floods the Pontine Marshes by destroying drainage pumps to contain the Anzio beachhead established by the Allied landings in 1944. Over 40 square miles of land were flooded; a 30-mile stretch of landing beaches was rendered unusable for amphibious support forces.
1944	Germany, Allied forces	Military tool	Yes	Germans flood the Ay River, France (July) creating a lake 2 meters deep and several kilometers wide, slowing an advance on Saint Lo, a German communications center in Normandy.
1944	Germany, Allied forces	Military tool	Yes	Germans flood the Ill River valley during the Battle of the Bulge (winter 1944-45) creating a lake 16 kilometers long, 3-6 kilometers wide, and 1-2 meters deep, greatly delaying the American Army's advance toward the Rhine.
1948	Arabs, Israelis	Military tool	Yes	Arab forces cut off West Jerusalem's water supply in fist Arab-Israeli war.
1950s	Korea, United States, others	Military target	Yes	Centralized dams on the Yalu River serving North Korea and China are attacked during Korean War.
1951	Korea, United Nations	Military tool and military target	Yes	North Korea releases flood waves from the Hwachon Dam damaging floating bridges operated by UN troops in the Pukhan Valley. U.S. Navy planes are then sent to destroy spillway crest gates.
1951	Israel, Jordan, Syria	Political tool, military tool, development disputes	Yes	Jordan makes public its plan to irrigate the Jordan Valley by tapping the Yarmouk River; Israel responds by commencing drainage of the Huleh swamps located in the demilitarized zone between Israel and Syria; border skirmishes ensue between Israel and Syria.
1953	Israel, Jordan, Syria	Development disputes,	Yes	Israel begins construction of its National Water Carrier to transfer water from the north of the Sea of Galilee

		military tool, political tool		out of the Jordan basin to the Negev Desert for irrigation. Syrian military actions along the border and international disapproval lead Israel to move its intake to the Sea of Galilee.
1958	Egypt, Sudan	Military tool, political tool, control of water resources	Yes	Egypt sends an unsuccessful military expedition into disputed territory amidst pending negotiations over the Nile waters, Sudanese general elections, and an Egyptian vote on Sudan-Egypt unification; Nile Water Treaty signed when pro-Egyptian government elected in Sudan.
1960s	North Vietnam, United States	Military target	Yes	Irrigation water supply systems in North Vietnam are bombed during the Vietnam War.
1962-1967	Brazil, Paraguay	Military tool, political tool, control of water resources	Military Maneuvers	Negotiations between Brazil and Paraguay over the development of the Parana River are interrupted by a unilateral show of military force by Brazil in 1962, which invades the area and claims control over the Guaira Falls site. Military forces are withdrawn in 1967 following an agreement for a joint commission to examine development in the region.
1963-1964	Ethiopia, Somalia	Development disputes, military tool, political tool	Yes	Creation of boundaries in 1948 leaves Somalia nomads under Ethiopian rule; border skirmishes occur over disputed territory in Ogaden desert where critical water and oil resources are located; cease-fire is negotiated only after several hundred are killed.
1965-1966	Israel, Syria	Military tool, political tool, control of water resources, development disputes	Yes	Fire is exchanged over "all-Arab" plan to divert the Jordan River headwaters and presumably preempt Israeli National Water Carrier; Syria halts construction of its diversion in July 1966.
1967	Israel, Syria	Military target and tool	Yes	Israel destroys the Arab diversion works on the Jordan River headwaters. During Arab-Israeli War Israel occupies Golan Heights, with Banias tributary to the Jordan; Israel occupies West Bank.
1969	Israel, Jordan	Military target and tool	Yes	Israel, suspicious that Jordan is over-diverting the Yarmouk, leads two raids to destroy the newly built East Ghor Canal; secret negotiations, mediated by the United States, lead to an agreement in 1970.
1974	Iraq, Syria	Military target and tool, political tool, development dispute	Military Maneuvers	Iraq threatens to bomb the al-Thawra dam in Syria and masses troops along the border, alleging that the dam has reduced the flow of the Euphrates River to Iraq.
1975	Iraq, Syria	Development dispute, military tool,	Military Maneuvers	As upstream dams are filled during a low-flow year on the Euphrates, Iraq claims that flow reaching its territory is "intolerable" and asks the Arab League to

		political tool		intervene. Syrians claim they are receiving less than half the river's normal flow and pull out of an Arab League technical committee formed to mediate the conflict. In May, Syria closes its airspace to Iraqi flights and both Syria and Iraq reportedly transfer troops to their mutual border. Saudi Arabia successfully mediates the conflict.
1978 onwards	Egypt, Ethiopia	Development dispute, political tool	No	Ethiopia's proposed construction of dams on the headwaters of the Blue Nile leads Egypt to repeatedly declare the vital importance of water. President Sadat states "the only matter that could take Egypt to war again is water." Egypt's Foreign Minister, Boutrous Ghali states, "the next war in our region will be over the waters of the Nile, not politics."
1981	Iran, Iraq	Military target and tool	Yes	Iran claims to have bombed a hydroelectric facility in Kurdistan, thereby blacking out large portions of Iraq, during the Iran-Iraq War.
1982	Israel, Lebanon, Syria	Military tool	Yes	Israel cuts off the water supply of Beirut during siege.
1986	North Korea, South Korea	Military tool	No	North Korea announcement of its plans to build the Kumgansan hydroelectric dam on a tributary of the Han River upstream of Seoul raises concerns in South Korea that the dam could be used as a tool for ecological destruction during war.
1990	South Africa	Development dispute, control of water resources	No	Proapartheid council cuts off water to the Wesselton township of 50,000 blacks following protests over miserable sanitation and living conditions.
1990	Iraq, Syria, Turkey	Development dispute, military tool, political tool	No	The flow of the Euphrates is interrupted for a month as Turkey finishes construction of the Ataturk Dam, part of the Grand Anatolia Project. Syria and Iraq protest that Turkey now has a weapon of war. In mid-1990, Turkish president Turgut Ozal threatens to restrict water flow to Syria to force it to withdraw support for Kurdish rebels operating in southern Turkey.
1991	Karnataka, Tamil Nadu (India)	Development dispute, control of water resources	Yes	Violence erupts when Karnataka reacts to and Interim Order handed down by the Cauvery Waters Tribunal. The Tribunal had been established in 1990 to settle two decades of dispute between Karnataka and Tamil Nadu over irrigation rights to the Cauvery River.
1991	Iraq, Kuwait, United States	Military target	Yes	During the Gulf War, Iraq destroys much of Kuwait's desalination capacity during retreat.
1991	Iraq, Turkey, United Nations	Military tool	Yes	Discussions are held at the United Nations about using the Ataturk Dam in Turkey to cut off flows of the Euphrates to Iraq.
1991	Iraq, Kuwait,	Military target	Yes	Baghdad's modern water supply and sanitation system

	United States			are intentionally targeted by Allied coalition.
1992	Bosnia, Bosnian Serbs	Military tool	Yes	The Serbian siege of Sarajevo, Bosnia-Herzegovina, includes a cutoff of all electrical power and the water feeding the city from the surrounding mountains. The lack of power cuts the two main pumping stations inside the city despite pledges from Serbian nationalist leaders to United Nations officials that they would not use their control of Sarajevo's utilities as a weapon. Bosnian Serbs take control of water valves regulating flow from wells that provide more than 80 percent of water to Sarajevo; reduced water flow to city is used to "smoke out" Bosnians.
1993	Iraq	Military tool	No	To quell opposition to his government, Saddam Hussein reportedly poisons and drains the water supplies of southern Shiite Muslims.
1993	Yugoslavia	Military target and tool	Yes	Peruca Dam intentionally destroyed during war.
1995	Ecuador, Peru	Military and political tool	Yes	Armed skirmishes arise in part because of disagreement over the control of the headwaters of the Cenepa River. Critics say this is primarily a border dispute simply coinciding with location of a water resource.
1997	Singapore, Malaysia	Political tool	No	Malaysia supplies about half of Singapore's water and in 1997 threatened to cut off that supply in retribution for criticisms by Singapore of policy in Malaysia.
1998	Tajikistan	Terrorism, political tool	Potential	On November 6, a guerrilla commander threatens to blow up a dam on the Kairakkhum channel if political demands are not met. Col. Makhmud Khudoberdyev made the threat, reported by ITAR-Tass News Agency.
1999	Lusaka, Zambia	Terrorism, political tool	Yes	Bomb blast destroys the main water pipeline cutting off water for the city of Lusaka, population 3 million.
1999	Yugoslavia	Military target	Yes	Belgrade reports that NATO planes have targeted a hydroelectric plant during the Kosovo campaign.
1999	Bangladesh	Development dispute, political tool	Yes	Fifty injured during strikes called to protest power and water shortages. Protest led by former Prime Minister Begum Khaleda Zia over deterioration of public services and law and order.
1999	Yugoslavia	Military target	Yes	NATO targets utilities and shuts down water supplies in Belgrade. NATO bombs bridges on Danube, disrupting navigation.
1999	Yugoslavia	Political tool	Yes	Yugoslavia refuses to clear war debris on Danube (downed bridges) unless financial aid for reconstruction is provided; European countries on Danube fear flooding due to winter ice dams will result. Diplomats decry environmental blackmail.
1999	Kosovo	Political tool	Yes	Serbian engineers shut down water system in Pristina prior to occupation by NATO.
1999	Kosovo	Terrorism,	Yes	Contamination of water supplies/wells by Serbs

		political tool		disposing of bodies of Kosovar Albanians in local wells.
1999	East Timor	Military tool, political tool, terrorism	Yes	Militia opposing East Timor independence kill pro-independence supporters and throw bodies in water well.

[1]Conflict may stem from the drive to possess or control another nation's water resources, thus making water systems and resources a "political" or "military goal." Inequitable distribution and use of water resources, sometimes arising from a water development, may lead to "development disputes," heighten the importance of water as a strategic goal, or lead to a degradation of another's source of water. Conflicts may also arise when water systems are used as instruments of war, either as "targets" or "tools."

TABLE 6 – WATER CONFLICT CHRONOLOGY[36]

WORD COUNT = 8,945

ENDNOTES

[1] "Environmental Diplomacy: Environment and U.S. Foreign Policy," 1997; available from <http://www.state.gov/www/global/oes/earth.html>.

[2] Peter H. Gleick, The World's Water 2000-2001 (Washington, D.C.: Island Press, 2000), 212.

[3] Gleick, The World's Water 2000-2001, 66.

[4] Phillip Lee, "Saving the Last Oasis," The Ottawa Citizen, 11 August 2001, sec. News, p. A1 (2971 words) [database on-line]; available from Lexis-Nexis, Academic Universe; accessed 30 August 2001

[5] Gleick, The World's Water 2000-2001, 21-22.

[6] Ibid., 21.

[7] Ibid., 1.

[8] Dan Johnson, "The World in 2015," The Futurist 35 (May/June 2001): 6-8 [database on-line]; available from UMI ProQuest; accessed 6 September 2001.

[9] Mitch Potter, "Rainwater Harvesting A Solution to Shortages," 19 March 2000, sec. News, (434 words) [database on-line]; available from Lexis-Nexis, Academic Universe; accessed 30 August 2001.

[10] Gleick, The World's Water 2000-2001, 33.

[11] Ibid., 182-3.

[12] Ibid., 184.

[13] Charlene Porter, "Every Precious Drop: Stretching Water Supplies," Global Issues Electronic Journal March 2001; available from <http:// usinfo.state.gov/journals/itgic/0399/ijge/gj-05.htm> Internet; accessed 30 August 2001.

[14] "Iraq Blames Turkey for 'drop' in Level of River Tigris," British Broadcasting Corporation Summary of Worldwide Broadcasts, 5 August 2000, part 4 (380 words) [database on-line]; available from Lexis-Nexis, Academic Universe; accessed 30 August 2001.

[15] Kader Asmal, "Water is a Catalyst for Peace," 14 August 2001; available from <http:www.dams.org/speeches/speech7.htm.>; Internet; accessed 5 November 2001.

[16] Paul Simon, "In an Empty Cup, a Threat to Peace," New York Times, 14 August 2001, sec. A, p. 17.

[17] Foreign Relations and Intercourse, U.S. Code, Title 22, sec. 2686a (2001).

[18] Aaron Salzberg, State Department POC/AO for Water Resource Management, telephone interview by author, 4 September 2001.

[19] William J. Clinton, A National Security Strategy for a Global Age (Washington, D.C.: The White House, December 2000), p. 35.

[20] Madeleine K. Albright, "An Alliance for Global Water Security In the 21st Century," 10 April 2000; available from <http://www.usembassy.cz/uscom13.htm.>; Internet; accessed 6 September 2001.

[21] "International Water Resource Association," IWRA Update Newsletter June 1999; available from <http://www.iwra.siu.edu/update/update_12_3.html>. Internet; accessed 6 September.

[22] Albright, "An Alliance for Global Water Security in the 21st Century," 5.

[23] Ibid, 8.

[24] Ibid, 4.

[25] Simon, 17.

[26] Albright, 6.

[27] Potter, 1.

[28] Marq De Villers, "Water Works: Fresh Water Supplies are Drying Up," Canadian Business and Current Affairs, June 2000, sec. V120, pp. 52 (3522 words) [database on-line]; available from Lexis-Nexis, Academic Universe; accessed 30 August 2001.

[29] "Environmental Diplomacy: Environment and U.S. Foreign Policy."

[30] Phillip Lee, "Saving the Last Oasis," The Ottawa Citizen, 11 August 2001, sec. News, p. A1 (2971 words) [database on-line]; available from Lexis-Nexis, Academic Universe; accessed 30 August 2001.

[31] Dan Johnson, "Solving Water Scarcity," The Futurist 33 (December 1999): 9 [database on-line]; available from UMI ProQuest; accessed 6 September 2001.

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[33] Dan Johnson, "The Coming Resource Wars," The Futurist 35 (Sep/Oct 2001): 16-17 [database on-line]; available from UMI ProQuest; accessed 6 September 2001

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[36] Gleick, The World's Water 2000-2001, 184.

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